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VIEWS, NEWS AND INTERVIEWS.

Senator Clarence Lexow, chairman of the committee which is engaged in the investigation of the New York city Police Department, is president of the Nyack, N. Y., Electric Light and Power Company.

"E. J. Hathorne, co-receiver of the Fort Wayne Electric Company, is a son of the former owner of the famous Hathorne coaches that before the West End consolidation crowded Washington street and Green street on their minutely trips between Charlestown Neck and the South End," says the Boston *News Bureau*. "The Fort Wayne receivership revives the old story of '50 for Hathorne and 50 for me.' Hathorne stood in his stable loft one day and heard a driver divide out his fares, '50 for Hathorne and 50 for me; 50 for Hathorne and 50 for me; here's an odd 50, what shall I do with it—give it to Hathorne? No, I am poor; take it myself.' Whereupon Mr. Hathorne appeared and said: 'You can cash up and go. Had you left me that odd 50 you could have stayed.' This appears to be about the case of the Fort Wayne receivership. It was 50 for Hathorne and his associates and 50 for the General Electric. The Hathorne people felt that the General Electric was getting too many odd 50s; hence the receivership."

A Chinese engineer, educated in New Haven, Conn., is about completing a telegraph line, 3,000 miles long, across the Gobi desert, from Pekin to Kashgar, Chinese Turkestan. It has been three years under construction, and poles in places were hauled 600 miles. Branch lines connect it with the Russian system.

A prominent member of the House of Representatives from New England went to Mr. Stone, the author of the bill to define and establish electrical units, and asked him if he would consent to the insertion of the following as an amendment to complete the measure: "The unit of resistance by the Senate to the demands of the sugar trust shall be known as the Havemeyer."

The request of Commissioner Andrews, of the New York city Department of Street Cleaning, for an appropriation of $37,000 for an electrozone plant at Riker's Island to disinfect the refuse dumped there has been referred to the Comptroller for examination and report.

Arthur Ennis, aged 13, is the "sub" telegraph operator and station agent at Bolckow, Mo.

Mr. W. R. Morris, of Birmingham, England, has brought out a combined ammeter and voltmeter, in which a single dial is used for the two instruments, there being two hands, as in the case of a clock. Each of these hands has a disk affixed to it, showing whether it belongs to the voltmeter or the ammeter. The instrument is of the gravity type.

THE "WOOD" ONE HUNDRED AND TWENTY-FIVE LIGHT ARC MACHINE.

ONE OF THE PRODUCTS OF THE FORT WAYNE ELECTRIC CORPORATION.

The illustration on this page shows the beautifully designed No. 10 arc light dynamo recently brought out by Mr. J. J. Wood and manufactured by the Fort Wayne Electric Corporation, of Fort Wayne, Ind. It has a rated capacity of 125 lights and runs at 500 revolutions per minute. The regulator is located in the pedestal shown at the right of the illustration and works so perfectly that 75 lights may be thrown off at one time without causing sparking at the brushes. The bearings are self-oiling and no expense has been spared either in material or workmanship to make a perfect machine. The design of the dynamo, as is apparent, is solid and artistic. The average commercial efficiency of this machine is said to be 90 per cent. While the rated capacity of this dynamo is 125 lights it was recently subjected to a test which showed the conservativeness of the rating. At Fort Wayne, one night recently, this machine ran 153 arc lights on a 38 mile circuit without undue heating.

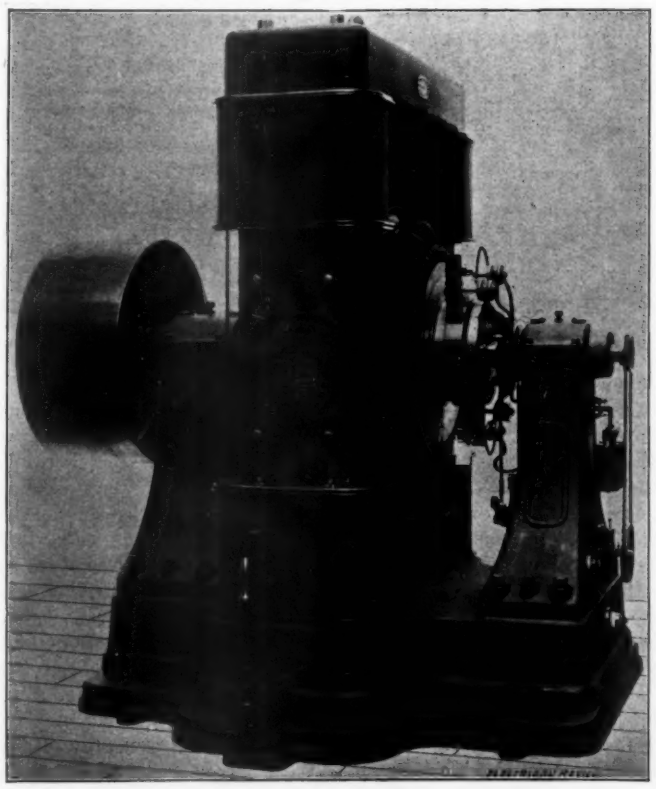


FIG. 1.—THE "WOOD" 125-LIGHT ARC DYNAMO.

On the following page is shown an isometric view of this dynamo and also the windings and connections.

With the high reputation of the "Wood" arc dynamos in mind, the progressive central station manager should not, and, doubtless, will not, hesitate to use this new No. 10 machine, especially as there is a large and growing demand for arc machines of 100 and 125 lights capacity.

A British Opinion on the Chicago-St. Louis Electric Railway Scheme.

The project for the Chicago and St. Louis Electric Railway is getting on as well as can be expected. The mail brings us a batch of American electrical papers, in which we see that the scheme has advanced as far as half-tone illustrations of the passenger car and the motor truck. There is, however, a suspicion about these pictures of their having been photographed from one-inch-to-the-foot models standing on an office table. The distance between Chicago and St. Louis is considerable, but experience will probably show that it is not greater than that between newspaper illustrations of models and the completion of the actual project.—*London Electrician.*

Bell Telephone Capital.

The indications are that Bell Telephone will get what it desires from the Massachusetts Legislature in the way of authority to increase its capital stock from $20,000,000 to $50,000,000. The Senate of that body last week defeated the amendment to increase the capital to $30,000,000, while the House rejected a substitute bill requiring the company to sell its new stock by auction instead of giving shareholders rights to subscribe.

FORT WAYNE NEWS.

WHAT CAUSED THE BREAK BETWEEN GENERAL ELECTRIC AND FORT WAYNE—MR. M'DONALD PROTECTS HIS FRIENDS, HIMSELF AND HIS CITY—ESTIMATES OF THE VALUE OF FORT WAYNE STOCK—OFFICERS OF THE FORT WAYNE ELECTRIC CORPORATION—HUMOROUS SIDE OF THE AFFAIR—THE CONSTABLE AND HIS GUN—THE FAITHFUL WATCHMAN—MR. BOLTON, OF THE BRUSH COMPANY, TELLS MR. PUTNEY A STORY.

The *coup d'etat* effected by Mr. Ronald T. McDonald, of Fort Wayne, Ind., in completely severing his company's relations with the General Electric Company is still the chief topic of conversation and speculation among electrical men. To those who have been familiar with the situation the complete separation of the Fort Wayne interests from General Electric did not come as a surprise, although the method of accomplishing the result caused them to gasp with astonishment at its suddenness and apparent complete success.

It is known that for some months past Mr. McDonald and Mr. Coffin have been considering various forms of a contract to be entered into between their respective companies. Mr. Coffin's idea was to close up the Fort Wayne factories and to manufacture their apparatus at Schenectady. Mr. McDonald had in mind three points he was bound to accomplish, and which he would not compromise on. The first was, that he insisted on the General Electric Company guaranteeing the paper of the Fort Wayne Electric Company which he had endorsed. The second was, that the minority stockholders, many of whom were Mr. McDonald's friends, and some of whom had bought Fort Wayne stock on that account, should be fully protected. This it was proposed to do by buying their stock and adding it to the already large, though not controlling, holdings of the General Electric Company. The latter company would then own the Fort Wayne outright, and could do with it as it pleased. Mr. McDonald was willing to leave the company under these circumstances, or he was willing to serve the company for one year without salary. The third point insisted on by Mr. McDonald was that the works at Fort Wayne should be kept running. The pay-roll of the company amounts to about $20,000 a month, and it can easily be seen that this is not a small item to a city the size of Fort Wayne. Mr. McDonald's course throughout these transactions was of a most commendable character. As a business man he wanted to protect himself, as a friend he insisted on taking care of the minority stockholders, and as a citizen he desired to help Fort Wayne all he could.

After numerous contracts had been drafted and considered the negotiations came to naught and the matter rested where it had started. Finally, about May 25 last, a meeting was held in New York city, at which were present, among others, Mr. Coster, of Drexel, Morgan & Company and the General Electric Company, Mr. McDonald and his counsel, Mr. W. B. Putney, of New York city.

At this meeting Mr. Coster is said to have told Mr. McDonald that further negotiation was useless; that the General Electric Company intended to send its own men to Fort Wayne on June 9 when the annual meeting of the Fort Wayne Electric Company's stockholders would be held, and that a board of directors satisfactory to the General Electric Company would be elected. This ended the meeting, but it didn't take long for Mr. McDonald and Mr. Putney to get their heads together and evolve a scheme to checkmate the General Electric Company.

Mr. McDonald, with only two weeks before the annual meeting to work in, immediately set about getting proxies from his friends among the minority stockholders. He found many such among the ex-officers and employés of the old Thomson-Houston Company. The par value of Fort Wayne stock was $25 a share. Mr. McDonald is said to own about 3,000 shares. We understand that among the proxies secured by Mr. DcDonald were those from Ex-President Pevear, of the Thomson-Houston Company, representing 8,000 shares, and from Mr. J. N. Smith, a former director and at one time the largest stockholder in the Thomson-Houston Company, representing 1,000 shares. Others were secured which gave Mr. McDonald the power he sought. The result was told in the columns of the ELECTRICAL REVIEW last week.

The order granted by Judge Dawson, of Fort Wayne, restraining the General Electric stockholders from holding a meeting on June 9, is returnable on June 18, when they are expected to show cause why the order should not be made permanent.

We learn that about the first of the year an expert from the General Electric Company went over the books of the Fort Wayne company and decided that the stock was worth $4.80 a share. The Fort Wayne company's expert, at the same time, figured that the stock was worth $6 per share. In any event, it is predicted that if the receivership stands and the Fort Wayne Electric Company is wound up, as seems probable, the assets will be sufficient to meet all the debts and leave a considerable surplus.

The Fort Wayne Electric Corporation, which was organized simultaneously with the application for the receivership, has contracted with the receivers to continue the business of the Fort Wayne Electric Company. The contract has been sanctioned by the court. The officers of the Fort Wayne Electric Corporation are R. T. McDonald, president; C. S. Knight, vice-president and C. C. Miller, secretary and treasurer.

The relations of R. T. McDonald and the Fort Wayne Electric Company to the defunct Madison Square Bank, of New York city, have been the subject of considerable speculation. A well-known electrical man, who was familiar with the affair, gives the following as his understanding of the matter:

Mr. McDonald was asked to become a stockholder and a director in the bank, and was willing to accept because of the additional financial facilities it gave the Fort Wayne Electric Company for its extending business. The bank loaned Mr. McDonald $150,000, with which he bought an equal amount of the bank's stock, so that no money changed hands. The bank was secured by $200,000 of Louisiana Electric Light Company's bonds (a local New Orleans electric lighting company, equipped by the Fort Wayne company), accompanied by an agreement under which the bank, if the loan was not met, agreed not to dispose of the bonds until their market price reached 90. The Seligmans, the well-known bankers, are said to have bought some of these bonds at 90. The receivers of the Madison Square Bank sued Mr. McDonald on this contract, but Judge Barrett sustained it, and remarked that if the bank had made a bad bargain it must not come to him for relief.

Thus it will be seen that the Fort Wayne Electric Company was practically a stockholder in the Madison Square Bank. It is said that the stockholders of the bank may be assessed to meet its debts, but it will probably be difficult to collect anything from the defunct Fort Wayne Electric Company, itself in receivers' hands.

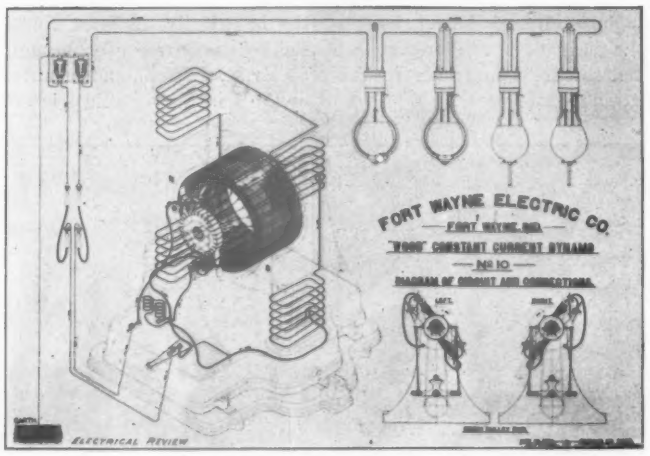


FIG. 2.—DIAGRAM OF CONNECTIONS OF THE "WOOD" 125 LIGHT ARC DYNAMO.

There were several humorous incidents connected with the affair at Fort Wayne on Saturday, June 9. One occurred when the constable served Judge Dawson's restraining order on the General Electric men while they were dining at the hotel. The constable, after serving the paper, carelessly and probably accidentally threw back his coat exposing a big revolver protruding from his hip pocket. Another occurred when the General Electric men went out to the Fort Wayne factory after five o'clock, when everything was shut down for the week. A faithful watchman drove them out of the grounds.

Among those present at Fort Wayne to observe the course of events was Mr. W. B. Bolton, of Cleveland, general counsel for the Brush Electric Company. He was there presumably in the interests of the General Electric Company. He met Mr. W. B. Putney, the lawyer who engineered the Fort Wayne end of the deal.

"Mr. Putney," said Mr. Bolton, "the present situation reminds me of a story."

"That so? Let's hear it."

"Well," continued Mr. Bolton, "there was once a traveling band of magicians and prestidigitators who strolled from place to place giving exhibitions wherever the size of the crowd seemed to warrant it. They reached one little town and gave a performance in an old building. After each mysterious feat had been performed by the prestidigitator, a Hoosier near the stage would remark, 'Gosh! That's wonderful! Wonder what in hell he'll do next?'"

"This remark was reiterated so often that a parrot in the room was quite captivated by it. Finally, the magician performed a trick in which fire was used. A spark got through the cracks in the floor in some manner and falling in a keg of powder stored in the cellar, created an explosion which wrecked the place. After the rumpus the parrot was found in an adjoining field, his plumage sadly damaged and remarking to himself, 'Gosh! That's wonderful! Wonder what in hell he'll do next?'"

"And that, Mr. Putney," concluded Mr. Bolton, "is just the way I feel about you."

It is reported that Mr. Brainard Rorison, secretary of the Fort Wayne Electric Company, will not be connected with the Fort Wayne Electric Corporation. It is rumored that he will devote himself to his large and important interests in New Orleans.

The announced policy of the General Electric Company to concentrate all its works at Schenectady extends, also, it is declared, to the Brush Electric Company.

The New York offices of the Fort Wayne Electric Corporation have been removed from 44 Broad street to 115 Broadway, where President R. T. McDonald will be pleased to see any of his friends whenever he is in the city.

The Stanley Electric Manufacturing Company's Two Phase Alternating Current Motor.

The Stanley Electric Manufacturing Company's two phase alternating current system and generators were described in last week's ELECTRICAL REVIEW. Herewith are illustrations and a description of the two phase motors which form a part of the system.

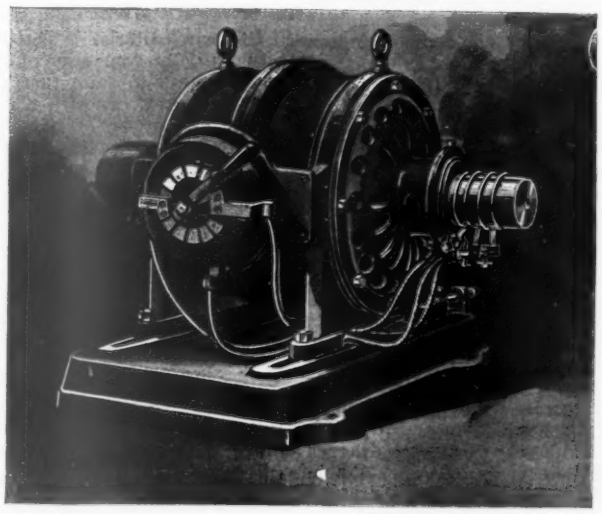


FIG. 1.—STANLEY ELECTRIC MANUFACTURING COMPANY'S TWO PHASE ALTERNATING CURRENT MOTOR.

The requisite conditions imposed upon an alternating current motor by the demands of commercial service are these: It must start from any position of rest with a torque considerably greater than its running torque, it must maintain an approximately constant speed under maximum variations of load, and its operation must not unduly disturb the potential of the system. The further qualities of simplicity of construction and operation and of efficiency in converting electrical energy into motive power are, of course, necessary. One object of the Stanley company has been to produce a motor which would be commercial on the standard frequencies used in this country in order to, in a great many places, simplify the problem of adopting multiphase apparatus because of the vast amount of money already invested in generators and transformers only adapted for this high frequency.

The Stanley two phase alternating current motor, known as the "S. K. C.," is shown in Fig. 1. Its principle of operation is entirely distinct from the so-called rotary field types of motor. In it there is no attempt to combine the influences of two sets of alternating current magnets in order to produce a rotating magnetic field. This motor may be best described as consisting of two parts, a motor proper and a rotating transformer, the two parts alternately exchanging their functions. It consists electrically of two fields, which are fed by currents differing 90 degrees in phase, and two armatures, though mechanically there is but one, as shown by the cuts. The winding is so connected that the wire, which lies directly under poles on one armature, is in series with the wire lying between poles on the other. It is clear that in this position one-half the machine acts as a transformer and the other half as motor.

The armature wound ready for service is shown in Fig. 2. The winding is not connected with the circuit, and consequently the only current flowing in it is an induced current. The field is clearly shown in Fig. 3. The coils are wound separately and then secured in place. These coils are the only part of the motor connected with the circuit. Being stationary, they are easily insulated to a high degree. The applied electro-motive force on the coils is 500 volts. A "compensating winding," which consists of short circuited coils of high conductivity, is placed in the field poles for the purpose of neutralizing the self-induction of the armature. This construction increases the starting torque of the motors so that in the standard motors of different sizes at starting a torque is obtained which varies from 50 to 200 per cent greater than the running torque at full load. This is a very ingenious invention and one of great importance in induction motors, and is covered by a broad patent issued to Messrs. Stanley and Kelly.

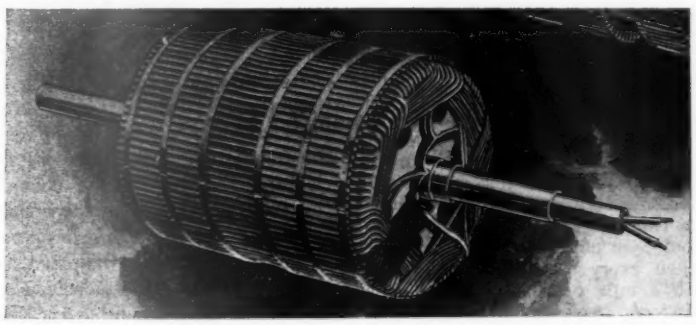


FIG. 2.—ARMATURE OF STANLEY ELECTRIC MANUFACTURING COMPANY'S TWO PHASE MOTOR.

A unique feature of the Stanley company's system is the use of a condenser, which is broadly covered by patents. The function of the condenser is to make the motor take current in proportion to its load substantially as direct current motors do, and it accomplishes the result so perfectly as to make commercial what has heretofore been only experimental. The condensers are connected in multiple with the fields of the motor and, when so placed, they supply the lagging component of the current or, in other words, the false current. Thus with this arrangement the false currents, instead of flowing back through the transformer line and generator, thereby disturbing the whole system, simply flow in a local circuit through the condensers. The condenser in use is no trouble and does not complicate the system. When once set up in place there is nothing to do to it, being like a transformer in this respect. Much study has been given by the Stanley company for the past two years to the manufacture of condensers for commercial use with their motors with the result that they are now thoroughly reliable and inexpensive. The manufacture of condensers for such use is practically a new art and its perfection a decided triumph.

The Stanley two phase motors are very efficient, about the same in this respect as direct current motors. In the larger sizes, it is said, the efficiency reaches 90 per cent and falls off gradually to 80 per cent in the five horse-power and 70 per cent in the one horse-power. These are the figures of actual efficiency as obtained by measurements with a wattmeter and not by volt-ampere readings.

The regulation of these motors is also said to be very good, the variation in speed between running light and fully loaded being from six per cent to 10 per cent in the various sizes.

Every day for a year and a half past these motors in various sizes have been used in Pittsfield, Mass., on two phase circuits from the central station of the Pittsfield Electric Company. This has given the Stanley company an opportunity to observe their performance on various classes of work and satisfy themselves about them in all respects by their practical commercial operation instead of by laboratory tests. These motors have been running machine shops, planing mills, printing presses, elevators, woodworking machinery and carding machines, and have, consequently, been subjected to trying conditions and in no single case have they failed to give complete satisfaction, and never once has a motor failed to perform its work continually without any trouble or attention, excepting an occasional oiling.

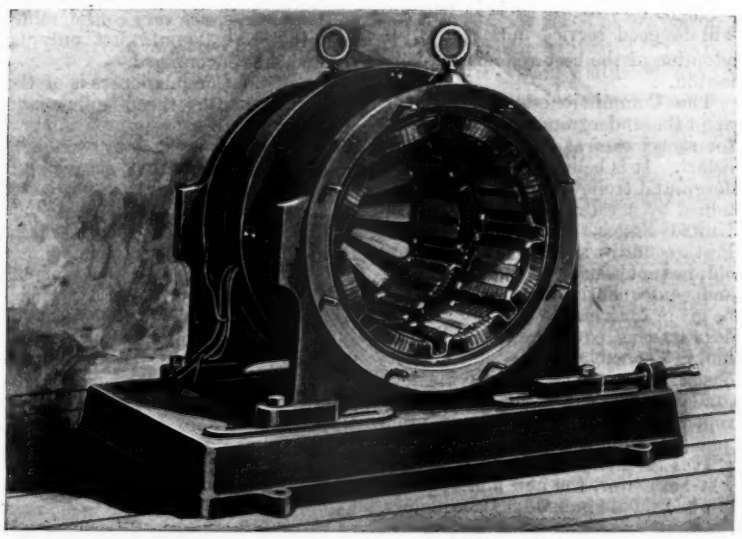


FIG. 3.—FIELD OF STANLEY ELECTRIC MANUFACTURING COMPANY'S TWO PHASE MOTOR.

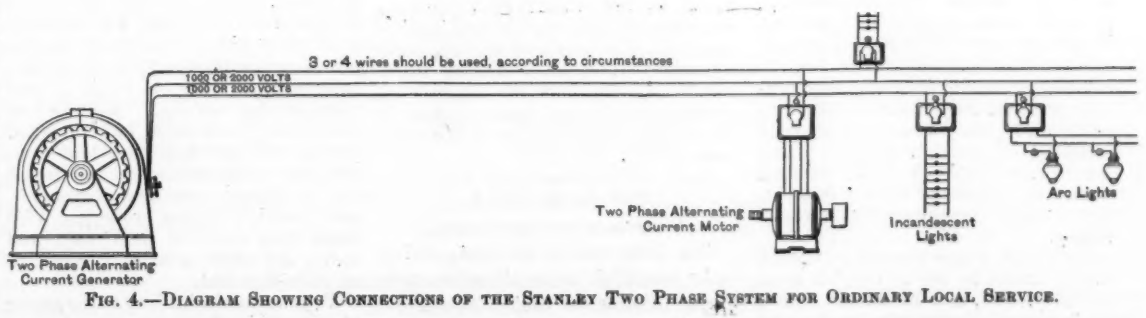

3 or 4 wires should be used, according to circumstances
1000 OR 2000 VOLTS
1000 OR 2000 VOLTS
Two Phase Alternating Current Generator
Two Phase Alternating Current Motor
Incandescent Lights
Arc Lights

FIG. 4.—DIAGRAM SHOWING CONNECTIONS OF THE STANLEY TWO PHASE SYSTEM FOR ORDINARY LOCAL SERVICE.

LITERARY.

The Municipal Laboratory of Paris, the most thoroughly organized and equipped department of food inspection, probably, in the world, will be fully described, with many illustrations, in the July number of *McClure's Magazine*.

The readers of *Household News* have a rich treat before them in the June number. Mrs. Rorer has outdone all former efforts in the extent and variety of her new recipes. Special attention seems to be given to the things that are seasonable.

The Underground Trolley in Washington.

The Commissioners of the District of Columbia have recently made the following interesting report to Congress on the proposition to authorize the Metropolitan Street Railway to change its motive power. Since the company abandoned its attempt to use storage battery motors it has been investigating underground trolleys, and is inclined to experiment with some of them. One of the District Commissioners is Col. Geo. Truesdell, who built the Eckington Trolley Line in Washington, and operated a branch of it with storage batteries for a year or more. He is one of the best informed men in the country on street railways, and in his present position will do good service in securing the adoption of the best systems in Washington.

The Commissioners do not look upon the underground electric system for street cars as being well established. It is believed there is no underground trolley operated and maintained by a railroad company in the United States, and that the Buda-Pesth conduit, now two years or more old, has not been duplicated in Europe; and, consequently, that latitude should be given for a choice between all conduit systems, excluding the cable system. The cable is noisy and dangerous; it was specially designed for steep grades, while the route of the Metropolitan road and that of any probable extension is generally level.

It is further judged that, excepting a steam motor, the new motive power allowed should include surface motors. Every recommendation as to car power for street railways made to the present Congress by the Commissioners has included surface motors. Subsurface constructions are always objectionable; they cause an extensive tearing up of streets; they frequently necessitate changes of water, sewer and gas pipes, whose avoidance is desirable; they require numerous manholes, whose covers and other iron surface constructions of the conduit break the smoothness of Washington pavements, diminish their freedom from noise, and, by frequent use, obstruct the streets.

Besides the prevention of objectionable conduits, a surface motor would tend to diminish the gridironing of the streets of the national capital.

The underground trolleys on the market number a half dozen or more, each enough different from the others to require separate tracks. There are now four tracks on Fourteenth street between H street and New York avenue. Rapid transit on all of them would practically block the street; the same is true of New York avenue between Fourteenth and Fifteenth streets. A part of Thirty-second street has three tracks; cars of three different companies now run on a part of Ninth street. The Metropolitan Company's cars reach the intersection of Seventh street and Florida avenue over the U street underground line. It is highly desirable for the public convenience that they should continue to reach that point, and this can only certainly be secured, without filling the whole roadway with railroad tracks, by the use of surface motors, the U street system, or the overhead trolley.

There are other examples of joint use of tracks in the city which must probably cease, and in case of future roads be made impracticable, thereby causing undesirable results, if different mechanical systems for propulsion of cars or different kinds of the same system are used by the different companies. As a rule, each company wants the exclusive use of a set of tracks in the public street. The suburban roads, generally built or projected to favor land investments, are seeking entrance to the heart of the city over new routes, whether the new route in the city is needed by the public or not. It is not the business of railroad companies to enhance or even preserve the quiet freedom from obstruction and beauty of the streets of Washington; they are looking for traffic alone, without regard to the general public interest.

An established surface motor would tend to displace the present overhead trolleys, which are not satisfactory on city or suburban streets. The motor would offer an alternative requiring no change of roadbed or tracks.

In short, the advantages of surface motors of compressed air, gas, vapor or other kinds, which are noiseless and smokeless, are very considerable, and their use should not only be allowed, but encouraged.

One of the Commissioners is of the opinion that, if overhead trolleys and conduits were positively prohibited, a satisfactory surface motor would be promptly produced. In fact, one kind of surface motor seems to be available, or, to say the least, is very promising.

According to a late report of the United States Consul General at Frankfort, published in the consular reports for April, 1894, gas motor cars are in successful operation at Neufchatel and Dresden; a line of such kind is being built at Dessau, and a commission, headed by a government railway engineer, sent by the city of Nordhausen to examine and report on the working of the new system, declares it to be a practical success and recommends its adoption at Nordhausen. All this is in the home field of the Siemens-Halske Electric Company, which installs electric roads and within reach of Buda-Pesth, where an underground trolley has been in operation for two years or more.

A full extract from the report of the Consul-General is submitted herewith. Its main points are that the two miles of gas motors are three and three and one-third miles long; that gas costs $1.05 and $1.09 per 1,000 cubic feet at the two places, and is supplied from the ordinary street mains; and that the loaded car climbs a grade of six and two-thirds per cent at four miles an hour, while the speed on low grades or levels is 11 miles and upwards per hour. Figures are given from an address before the German Gas Association, of comparative costs of construction and equipment of a five-mile track line for overhead trolley, gas motor and horse car system, making the cost of the gas motor system but little more than for the horse line, and considerable less than for the electric. The expert author of the address is quoted as stating that the net operating expenses of horse cars in Germany is five and one-half to seven cents; of electric cars, five cents and gas motor cars four cents, each per car kilometer; or, in other words, the gas motor system not only costs less for construction and equipment than the overhead trolley, and, consequently, much less than for a conduit system, but the expense of operation of the gas motor system is 20 per cent less than that of the overhead trolley.

Our Great Head.

(Howard in the New York *Recorder*.)

The ELECTRICAL REVIEW, which looks beautiful in its attractive new dress, informs us that "New York city is nearer to rapid transit than ever before."

Why, certainly! And to-morrow it will be nearer yet. Great head!

That Knotted Telephone Cable.

TO THE EDITOR OF ELECTRICAL REVIEW:

In compliance with your request, I will endeavor to give you an account of the trouble we had in Hampton Roads when the knot in the Okonite cable I recently sent you was made. The particular specimen sent you, and of which you have had an excellent cut made, was not much worse than some five or six others made at the same time.

In June, 1892, the Southern Bell Telephone and Telegraph Company laid a telephone cable in Hampton Roads, between Old Point Comfort and Willoughby Sand Spit (three miles), touching at Rip Raps, the old stone pile so familiar to every visitor to Fortress Monroe. The Rip Raps is just one mile off Old Point and two miles off Willoughby Spit, and is availed of as a test station for the cable.

The cable worked beautifully until the memorable freeze of January, 1893, when this section experienced the most protracted spell of severely cold weather felt in 40 years, to say nothing of the proverbial "oldest inhabitant." Hampton Roads was gorged with ice from shore to shore, and between Old Point and Rip Raps (the channel) many vessels dragged their anchors for a week. The staunchest ships were helpless; they dragged anchors to and fro with the tide and ice. Vessels would go out half a mile and back again, and thus seesawing went on, with our cable right in the track of the anchors. The cable was broken the first day of the ice gorge. Further than that, the Old Point end had been pulled out and carried away. We knew nothing more as to the extent of the damage until the ice went out sufficiently (a week later) to enable us to reach Rip Raps, when we found the Rip Raps end still holding. We were provided with a commodious barge and strong tug boat alongside to handle it. We took aboard the Rip Raps end and reeled toward the other end of this piece of cable, which we found about 1,800 feet away. We now had 1,800 feet of cable safely reeled up and the rest of it at the bottom of the deep blue sea, but just where only Mr. McGinty could have answered. We proceeded to Old Point, tied up the barge and went to dragging with grapnels for the missing cable. We found piece after piece until we had four or five pieces, but this was not all, and drag as we would, we could find no more. We raked every foot of bottom within half a mile of where the cable had lain. A week or so after we had abandoned our search, and when getting ready for new cable to replace what was missing, a tug anchored just outside the limits of our "scratching," and when she wanted to leave, could not get her anchor at first, but finally succeeded in raising it to the surface, with the missing cable hanging on. The tug people slipped the cable, buoyed it and notified us. We recovered it the next day, and it was in this piece we found the puzzling knot sent you. We spliced up the pieces and with 600 feet of surplus cable we had in stock, relaid it and re-established service. We now had six splices in this cable, but it worked just as well as when first laid new, and has continued to do so, except for an interruption last November, when a ship's anchor broke it. This break was repaired next day, and to-day the cable is as well insulated as when first laid.

The mechanical injury to the armor of the cable was so severe at some places, that on cutting out the damaged section we were surprised to find the conductors in good conditions, and the insulation unhurt. The conductors and insulation in the curious snarl of which you have had a cut made are perfect, notwithstanding the evident strain to which this piece of cable was subjected.

Very truly yours,

J. W. CREWS,

Manager Norfolk Telephone Exchange.

Norfolk, Va., June 4, 1894.

Price of Electric Car Equipments.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your editorial "The Business Situation" in your issue of May 23, do you mean to state that you can get an electric car with a complete equipment for $640? If so, will you please name the company? S. W. Whitman, Mass., June 7, 1894.

We meant to state, and did state, that one electric car equipment (the electrical apparatus exclusive of the car itself) had been sold for $640. All the figures quoted in our editorial were exclusive of the car body, which is usually reckoned as a separate item. Such a low price cannot be obtained regularly even at this time. You will notice that the inference to be drawn from our remarks was that this was an exceptional case. The manufacturer who sold this especial equipment undoubtedly had his reasons for doing so he certainly made no profit on the sale. Perhaps he wanted to introduce his apparatus in the particular locality in which the sale was made and was willing to make a sacrifice to do so.

We refer you to our advertising pages for the names of manufacturers of electric railway equipments.

Electric Railway Work in Chicago.

The Chicago *Tribune's* financial writer states that "The season of the year has been reached when earnings are certain to increase rapidly, and there is a tendency to react from the low stage which was reached a few weeks ago. Much is expected from the change in the motive power of the North and West Side lines to electricity. The work of changing the system is being rapidly pushed forward on the North Side lines under the charge of J. R. Chapman, who three years ago made a decided success in changing the cable and horse car systems of the city of Grand Rapids to electric lines. The North Side Street Railway Company has placed the work in the hands of Mr. Chapman, giving him the title of general manager of the electrical department and installed him in a building at No. 544 North Clark street. This building, formerly occupied as a residence, has been equipped as an office and working headquarters for the electrical force."

Charles R. Pope, manager for the State of Missouri for the Strowger Automatic Telephone Exchange, recently showed the working of the new system at the Rialto building, St. Louis, Mo. Notwithstanding the fact that the contrivance was widely advertised, and that upon this occasion the peculiar advantages of the system would be practically exemplified, there were only five persons present, says the *Republic*. The trial was only partly successful.

Details of The "Cock" Arc Lamp.

A successful attempt to design an arc lamp to be used in places for which incandescents only have been employed has been made by M. Cadiot, 44 Rue Taitbout, Paris, whose "Cock" lamp is illustrated in the accompanying illustration, taken from the London *Electrician*. Between the poles of the electro-magnet A B, wound with thin wire of 500 ohms resistance, is pivoted an iron armature J, to which is fixed a lever N. The solenoid C, also wound with wire of the same resistance as the electro-magnet, draws the carbons close to each other, when N makes contact with *b*, while the solenoid D, wound with thick wire of a resistance of 1.5 ohms, separates them when N, making contact with *a*, puts the lamp in circuit with the resistance E. The solenoids actuate two arms, F and G, which move an endless screw, tangential to a wheel round which is a chain attached to the carbon holder. The current being switched on, the electro-magnet A B attracts the movable armature J, and the lever N, making contact with *b*, the solenoid C is put in circuit, and its armature F causes the carbons to come in contact. The difference of potential at the poles of the magnet becoming very small, its force is overcome by the opposing spring H, and N, therefore, makes

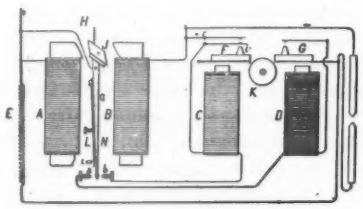
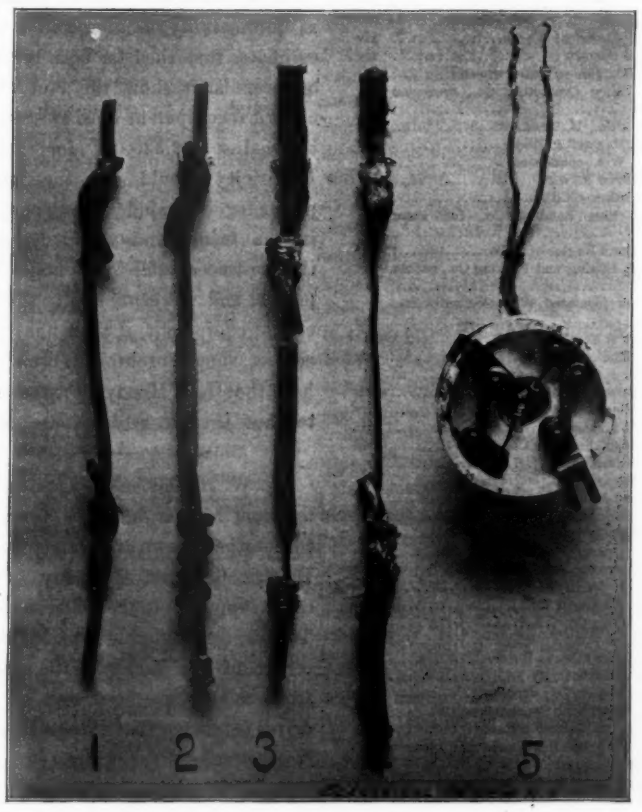


DIAGRAM OF THE MECHANISM OF THE "COCK" ARC LAMP.

contact with *a*, so that the current is diverted to the thick-wire solenoid D, the vibration of whose armature, G, continues until an equilibrium is attained between the attraction produced by the magnet A B and the action of the spring H. The difference of potential at the poles of the magnet increases as the carbons consume, and the action goes on as before—the lever N makes contact with *b*, and the solenoid C is put in circuit. To prevent sudden recoils, which may be caused by the impurity of the carbons or by the instability of the armature J, the lever N is mounted on a spring L, whose pull is added to that of the spring H, but which is released before the contact with *b* brings the carbons together. The lamp is small, and, it is claimed, takes but little current. The candle-power may, it is stated, be varied from 100 candle-power to 400 candle-power, by the aid of a rheostat, operated according to whether more or less light is required. A suggested advantage of this lamp is that, owing to the recoil movement, it can be successfully used in installations where the dynamo is driven by an engine subject to variable loads, and its small size allows it to be fitted into electroliers, pendants, etc, as well as for public lighting.

A Pretty Collection of Wiring Joints.

The illustration on this page shows several sections of wire, including joints removed from the interior wiring system of a carpet and rug factory in Philadelphia. They are specimens of work done by so-called "electricians" whose only recommendation is the cheapness of their work. These are but a few examples removed by one firm of reliable contractors—the Novelty Electric Company. Every good wireman has been called upon at one time or another to remove just such botched work, which serves to show the character of work done by unreliable contractors for people whose only thought is the cost of installation. How such work can be accepted and passed by the insurance underwriters is a mystery which



WIRE JOINTS AND A CUT-OUT TAKEN FROM A BUILDING IN PHILADELPHIA.

the ELECTRICAL REVIEW would like to hear more about.

The joints numbered 1 and 2 are loosely twisted together and their quality is apparent. Numbers 3 and 4 are pieces of No. 4 wire with the two ends connected together by No. 12 wire. Number 5 shows a ceiling rosette fused with 50 ampere fuse wire and using No. 18 annunciator wire as a drop.

That the building in which these specimens were found did not long ago burn down is a wonder. The ELECTRICAL REVIEW would like to have the views of Mr. Alfred E. Braddell, of Philadelphia, who is, we believe, the electrical inspector for the Underwriters' Association of the Middle Department.

The Strowger Automatic Telephone Exchange is being sued by C. M. Upton for alleged violation of agreement to operate apparatus in Pennsylvania, Missouri, Ohio and Michigan.

Lighting at Union, Mo., by Alternating Currents.

The electric lights in the town of Union, Mo., were successfully started on the evening of June 6, the event being made the occasion of a great celebration. This plant, which was designed by Wm. H. Bryan, consulting engineer, of St. Louis, presents some novel features. The lights are operated from Mr. A. A. Tibbe's Westinghouse station at Washington, Mo., 10 miles distant. The current used on the primaries in Washington and Union is 1,000 volts alternating. At Washington a step-up transformer is used, raising the voltage to 4,000, and the current is then transmitted over a pair of No. 8 wires, a step-down transformer being located at the entrance to the town of Union. The service in Union consists at present of 250 sixteen candle-power commercial lights, and five 50 and sixteen 32 candle-power street lamps. Although Union is a town of less than 1,000 inhabitants, and the consumption of light there is necessarily limited, the recent advancements in transformer construction, and the low cost of copper, have made it possible to handle this service profitably from the Washington plant. It is estimated that with the average load the losses due to transformation and transmission will not exceed five per cent.

Beacon Vacuum Pump and Electrical Company.

The Beacon Vacuum Pump and Electrical Company, Irvington street, Boston, Mass., announce that they have never had so many orders ahead for incandescent lamps as during the present season. The trade in general seems pleased with their method of doing business, and speak of their product in the highest terms.

The Buda-Pesth Conduit Electric Railway.

A British alderman recently inspected the electric railway system of Buda-Pesth, Hungary, and favored a local paper with his observations, which have been summarized by the London *Electrical Engineer*.

The Buda-Pesth electric railway was first begun some six or seven years ago by Messrs. Siemens & Halske, and when it had been completed, so far as the present lines are concerned, they floated it as a company, with a capital of 4,000,000 florins, which in English money is a little over £330,000. The company in the first year of its existence paid a dividend of seven per cent on its capital, and last year it paid eight per cent, and the shares on the market to-day stand at 225 florins for every 100 florins invested. The power station is centrally situated, and from this point all the lines are worked. The total capacity at the company's disposal represents 1,750 horse-power, which means that they possess a duplicate service of dynamos and engines in the event of a breakdown. On ordinary week days about 600 horse-power is required to work the traffic, but on Sundays—the continental holiday-making day—from 800 horse-power to 900 horse-power is required. The fare charged is six kreutzers for one length; if a change is made, taking an additional line, the charge is eight kreutzers; but if a double change is made, then 10 kreutzers is the fare. This means that for about 2*d*. English money a passenger may travel six to seven miles. The total length of the lines laid down on the conduit system is about 30 kilometres, or 18½ English miles. There is also a short distance of tramway on the overhead system, but this will be reconstructed on the conduit system as soon as convenient. At first the company experienced some little difficulty in working the lines, occasioned by mischievous people interrupting the electric current by putting a piece of metal down the conduit, but this form of amusement did not last long, and they have experienced no trouble of late. Slight interruption has also been met with from drifting snow, but it has never been of any serious duration, from half to three-quarters of an hour always sufficing to clear away the obstruction. In the low-lying portions of the city heavy rains have also occasioned slight difficulty, owing to the sewers not having sufficient capacity to take off the surface water which has flooded back into the conduit. But, with these slight drawbacks, the system works as smoothly as can be wished. Each carriage is constructed to carry 32 persons, but as no by-laws exist against over-crowding, standing room is permitted, and so on occasions cars may be seen with from 60 to 70 people in them. Each car, including the motor, weighs from four and a-half to five tons, and cost about £500. The system is most popular in Buda-Pesth, and last year the company carried no less than 12,500,000 passengers, which practically means that, taking an average, each individual inhabitant used the cars 21 times in the course of the year. This year, however, the company expect to overtop these figures by 2,000,000. The cost of construction per kilometre, including the power station, workshops, waiting-rooms, cars, etc., is stated to be 95,000 florins, or say about £13,350 per English mile.

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"The ELECTRICAL REVIEW is certainly the leading electrical journal." Mr. H. W. Schroeder, of Wichita, Kansas, pens the above solid truth under date of June 13, 1894.

We thought electricity would yet have an inning with the now famous Lexow investigating committee. Chairman Lexow, it seems, is president of the electric light company at his Nyack home. The electric light and electric railway men are generally the prominent, alert citizens of the community in which they live.

In response to numerous inquiries we state that arguments are now being heard by Judge Carpenter, of the United States Circuit Court, upon the suit of the United States Government to annul the Berliner transmitter patent owned by the American Bell Telephone Company. It is not probable that a decision will be given until after the Summer months.

PROSPECTS OF RAPID TRANSIT FOR BOSTON.

The Meigs rapid transit bill passed the Massachusetts House on the 13th inst. by an overwhelming majority, the vote standing 121 to 29. All the amendments offered by the Finance Committee were defeated, and it is now generally acknowledged that Captain Meigs will receive the franchise. The system, as shown by the working model at the State House, is not a particularly pleasing one to the eye, but it is claimed to have several great advantages over any other yet devised. One great drawback to the proposed system is that it is contemplated to use steam as a motive power, instead of electricity. This is not so much owing to choice as to necessity, as the comparative estimates furnished for both methods of propulsion show the cost of an electrical equipment to be $28,800,000 as against $2,520,000 for steam. Electricity should be the motive power for all rapid transit purposes in the future, and would be by far the most acceptable to the majority of people, and it seems a pity that the cost of equipment, if these figures are correct, should prohibit its use. Perhaps the Hon. Moody Boynton could tell how it could be done cheaper.

Mr. W. H. Patton is again trying to boom his car, and has formed a corporation known as the Independent Electric Traction Company. Each car is supposed to be self-contained. That is, a gas engine is placed in the center of the car, fed with gasoline from a tank overhead, and in turn drives a dynamo that charges a set of storage cells, from which current is supplied to a motor supported on the car axles. With the addition of a compressed air motor the car would only need a compartment to hold a team of horses to be of practical if not commercial ultility.

An analysis of some bids recently offered for the construction of an electric plant shows that some of the bidders actually offered to construct, equip and place the entire plant in operation for a less sum than the material alone could be purchased for in open market. This reckless method of bidding cannot be too severely condemned. It benefits neither the bidder, the purchaser or the supplyman. If such bids are accepted in good faith, they can be carried out only at a loss to one of these parties, and probably all will suffer.

There will be a large increase in the number of incandescent lamp manufactories after November 11 next.

THE BOSTON INCANDESCENT LAMP COMPANY DEFEATED.

The suit of the Edison Electric Light Company against the Boston Incandescent Lamp Company, asking for an injunction against the latter company to restrain them from manufacturing the "Pollard" lamp, was decided by Judge Colt, of the United States Circuit Court, on the 11th instant, and a decision rendered in favor of the Edison Company.

The outcome of the suit is only what has been generally expected, the only surprise being that the decision was so long delayed. This is accounted for by the fact that Judge Colt has been for some time past unusually busy, and not, as some ventured to believe, from any grave doubts entertained by him as to the points involved.

His opinion is brief and to the point and at the same time very explicit. He says in part: "The defendants' lamp, constructed after the Pollard patent of November 1, 1892, contains all the elements enumerated in the Edison claim, namely, a carbon filament, all glass receiver, from which the air has been exhausted, and conductors passing through the glass. The only difference between the two lamps is that the defendants use a film of powdered silver for the conductors passing through the glass, in place of platinum wire, which Edison points out in the specification of his patent as the material to be employed, and which is always found in the Edison lamp of commerce. In other respects the lamps are identical. While Edison uses platinum wire, he does not limit himself to this form of conductor in his claim. The language of the claim is 'conductors passing through the glass,' and, therefore, on its face the claim covers all kinds of material capable of carrying the electric current. If the claim had been limited to conductors of platinum wire, as the filament is limited to carbon, the case might be different.

"The argument of the defendants is that this claim of the Edison patent must be limited to the use of platinum wire as a conductor, or its known equivalent, and that powdered silver was not a known equivalent at the date of the Edison patent.

"Looking generally at the state of the electrical art at the date of the Edison patent, and comparing platinum wire and powdered silver simply as elements apart from any specific combination or invention, it cannot be said that one was not a known equivalent of the other, because powdered metals, including silver, have been recognized since 1860 as conductors of electricity."

In concluding his opinion, Judge Colt further says:

"In dealing with a pioneer invention which creates a new art it hardly seems logical or reasonable to say that, because in the progress of such art some new substance or device has been discovered which can act as a substitute for one of the elements of the patented invention, anyone can appropriate the invention by the employment of such substitute."

There is one clause in the opinion,

however, which seems open to contradiction and on which a question has already been raised. Judge Colt states, "the invention of Edison resides in the carbon filament; the other elements of the combination were old and subordinate, and represent, so to speak, only the environment of the filament."

It has been generally believed that the great strength of the Edison patent lay in the "combination" of the various elements, and was not dependent on any one of them separately. If the carbon filament is the sole point at issue, then any lamp containing this element is an infringement; yet such does not seem to be the case.

The main difficulty seems to lie with the Patent Office, and it has reached such a pass now that an inventor who has a patent granted him, is presented, not with a patent, but a law suit, which he must either prosecute or defend, as the case may be.

If a patent carried with it the protection for which it is supposed to be granted, and for which the government is paid, it would be worth having; but under the present patent laws it is merely an expensive myth, and the unfortunate inventor, or the capitalist who undertakes to develop the invention, is in much the same situation as the individual, "with an elephant on his hands." H. G. T.

PERSONAL.

Mr. E. P. Roberts, of the Correspondence School of Technology, Cleveland, Ohio, was a recent visitor to New York.

Miss Caroline Southmayd and Mr. George Barton Muldaur, associate editor of the *Electrical Engineer*, were married at Elizabeth, N. J., on June 14.

The Berlin Iron Bridge Company, of East Berlin, Conn., have appointed Mr. W. E. Stearns their purchasing agent, to fill the vacancy caused by the death of Wm. H. Riley.

Mr. Charles Wirt has returned to Chicago from New York, where he arranged to handle several new specialties. During the Summer Mr. Wirt will reside at his country home, at South Haven, Mich.

Mr. Aleck H. Lewis, who has accepted an important agency for the Abendroth & Root Manufacturing Company, left New York for Cincinnati last Thursday. Mr. Lewis will make Cincinnati his headquarters and will probably establish offices in the new Perin building, at Fifth and Race streets.

On June 6, 1894, in St. Agnes Chapel, New York city, Miss Frances Scrivener was married to Mr. Ira W. Henry, the expert electrician for the Bishop Gutta Percha Company. Immediately thereafter the happy couple started on an extended tour through the South. Mr. Harry D. Reed acted as chief usher. The bride was accompanied by her father, Captain Theodore Van Raden. Captain W. Wolcott Marks, the well-known Superintendent of the Bishop Gutta Percha Company, performed the duties required of the best man.

OUR CHICAGO LETTER.

The Northwestern Electrical Association's Summer meeting, to be held at St. Paul, promises to be a most important one. Secretary H. C. Thom has secured a number of high-class papers relating to the practical operation of central stations.

Cushing & Morse, the active pushers of Kerite, are sending out some more novelties in the advertising line to further attract the attention of users of high-grade insulated wires to the merits of Kerite. Their explanation of the difference between red tape and Kerite tape is well worded.

The Newberry Library officials are highly pleased with the vacuum steam heating system installed by Warren Webster & Company, and which has entirely corrected all the difficulties they had to contend with in the gravity system. Now they are decided converts to the economy of "pulling" steam rather than pushing or forcing it by back pressure.

The Johnson system of elevated electric railway, a model of which was exhibted in the Manufactures building at the World's Fair, is receiving liberal notice in the daily press, and a company, known as the Elevated Suspension Electric Railway Company, has been formed to control the patent, "but as yet no franchise has been secured for the building of a road."

Wilson & Sturges, the Chicago brokers, are quoted as follows in the *Inter-Ocean*: "A gentleman who stands very close to the management of General Electric says in regard to the recent raids on the stock: 'Don't let raids frighten you. We are not supporting the stock, but are satisfied to hold it. The company is doing a fair business, and is absolutely sound. We have lately invested between $600,000 and $800,000 in our own bonds, and have about $1,000,000 cash in the banks.'"

Mr. Z. A. Barrett is exhibiting an electric starter at Garfield Park for horse races. It includes a rubber tube stretched across the track. The instant withdrawal of this tube on the turning of a switch is the signal for the start, and simultaneously a miniature motor car is started on a trip around the track, keeping just abreast or ahead of the horses, the motor being wound for a mile-a-minute gait, if necessary. This motor car runs on a five-foot track, and the cost of the entire apparatus is about $250.

Mr. P. C. Ackerman was in Chicago last week arranging with Mr. Francis E. Donohoe to open a warehouse and salesrooms for the more rapid handling in the West of the products of the American Electrical Works, of Providence, R. I. Heretofore Mr. Ackerman has visited Chicago several times a year and handled orders from his New York office. Thus western customers will appreciate the enterprise shown in opening a western house and placing so energetic a manager in charge as Mr. Donohoe, who is well known to the fraternity. F. De L.

Chicago, June 16.

Wall Street and the Electrical Stock Market.

The market has not differed in any material respect from that of previous weeks of the Spring. It has been almost entirely professional, fluctuating through a narrow range. Its history is a record of bear attacks and bull manipulation, which have failed to move prices except in a few speculative specialties. All eyes are turned on Washington and nothing can reasonably be expected in the way of higher values until the Tariff issue has been settled.

Bell Telephone weakened, selling down from 201½ to 193 and rallying somewhat toward the close. It declared the regular quarterly dividend of 3 per cent payable July 16. It was thought that an extra dividend of 3 per cent would be declared. This is the first July since 1888 that the company has failed to pay an extra dividend. Last February, upon the expiration of the Bell Telephone patents, the company made a concession in telephone rentals to its licensees which amounted to about $600,000 per year. This on $20,000,000 capital is equivalent to about 3 per cent. Arguments in the suits to annul the Berliner patent which controls long distance communication were begun before Judge Carpenter in the United States Circuit Court at Boston during the week. There is current some talk of reducing long distance tolls.

General Electric has enjoyed a bull manipulation during the week, the price being advanced from 36 to 38, and later reacting with the general market to 36½ to 37. All reports I have received concerning the company are to the effect that it is doing a good and steadily growing business. Its weekly pay-rolls at Lynn and Schenectady aggregate about $53,000. There were no new developments in the Fort Wayne matter during the week, and the opinion has settled into the conviction that the Fort Wayne crowd has scooped General Electric. The Fort Wayne stock, which for months has been quoted at about $2, and which was valued by General Electric in its report at $1, has advanced to $11 per share during the week. The fact that General Electric lacks about 3,000 shares of a sufficient number to control the company is a plausible reason for this advance. It is more than likely that each party to this controversy has entered the market as purchasers.

Westinghouse Electric was without material change at 52 to 53 for the preferred, and 36½ to 37½ for the common stock. The question of a dividend upon the common stock will probably be passed upon next week.

The change in telephone stocks for the month is shown in a table which follows. All the important stocks show an appreciation in value:

	May 19.		June 16.	
TELEPHONE STOCKS.	Bid.	Asked.	Bid.	Asked.
Bell	189½	190	202½	203
Erie	43½	....	46	46¼
Hudson River	32	34	34	35
Mexican	....	1.00	70¢	90¢
New York & New Jersey	96	97½	.....	....
New England	56¼	....	61	62

At the annual meeting of the Chicago Edison Company, all the old directors were re-elected. The financial statement presented was for the 15 months ending March 31, 1894. During that period the business has increased 20 per cent, and 50,000 new lights had been connected.

The gross income was $2,141,779; repairs, renewals and general expenses, $1,461,102; net income from all sources $680,677.

The balance sheet shows, assets: Plants, real estate and franchise, $6,035,279; work in progress and material less collections on account, $219,095; accounts and notes receivable $238,890; due from stockholders May 31 and July 31, 1894, $450,276; cash, $254,286. Total, $7,197,828.

Liabilities: Capital stock, $4,200,000; bonds and debentures $2,325,300; surplus account, $254,260; accounts and notes payable, $393,450; open accounts, $24,818, $418,268. Total, $7,197,828.

The annual meeting of the stockholders of the Southwestern Telegraph and Telephone Company, known as the Erie Telegraph and Telephone Company, was held during the week at the Imperial Hotel. There were 30,000 shares represented. The treasurer's report for the year ending March 31, 1894, showed the gross earnings of the company to be $1,009,732.56. The surplus after all dividends had been paid was $192,000. The total surplus of the organization is $250,000.

The following directors were elected for the ensuing year: Abner S. Adams, Chas. E. Adams, Chas. J. Glidden, Wesley A. Cove, Francis Jewett, David B. Parker, J. W. S. Pickering, Asa C. Russell, Thomas Sherwin, Levi Sprague, H. Fred. Stevens and Harvey A. Whiting. The directors then organized by the choice of the following officers: Levi Sprague, president; Charles J. Glidden, secretary and treasurer; James P. McKinstry, of Cleveland, Ohio, was selected to serve as general manager for the company. The Erie Telegraph and Telephone Company operates in the following territory under the Bell patents; Ohio, Minnesota, North and South Dakota, Arkansas and Texas. Bain.

New York, June 18, 1894.

OUR BOSTON LETTER.

The New England department of the New York Insulated Wire Company, which was formerly located at 182 Summer street, has been removed to 134 Congress street.

The Whitney Electrical Instrument Company, of Penacook, N. H., are doing a splendid business in their new line of alternating current instruments. Reports received from Mr. Kellogg, now on his way to California, show that the new instruments are meeting with much favor through the South and West, and orders are coming in rapidly.

The Boston Incandescent Lamp Company have stopped manufacturing all but their series lamps for arc and alternating currents, which they will continue to supply to the New England trade as heretofore. Johnson & Merritt, formerly general sales agents for the Boston Lamp Company, have dissolved partnership. Mr. Merritt will handle the series lamps for the Boston company and Mr. E. O. Johnson will continue in the commission business, acting as manufacturers' agent for the National India Rubber Company and the American Carbon Company. Mr. Johnson retains his headquarters at 70 Pearl street, Boston, and is on the lookout for a few more good specialties. He has an unusually large acquaintance among the central station men throughout New England, and is very popular with the trade generally.

Boston, June 16. H. G. T.

HOW TO MAKE SMALL ELECTRIC LIGHT PLANTS PAY.

VIEWS OF A GAS MAN AS PRESENTED TO THE WESTERN GAS ASSOCIATION, BY I. C. COPLEY.

I am convinced that it is impossible to independently operate an electric lighting plant, at a fair profit, in the smaller cities embraced in the territory of this association (having a population of less than 25,000) under the conditions that obtain in a very great majority of them. However gratifying this conviction may be to those of us who have been compelled to compete with the much lauded "light of the sun," through all the stages of its extravagant claims and praises, we are much more deeply interested in the question "How to make a small electric light plant pay." And as gas men, we are most anxious to know if such a plant can be made profitable, in conjunction with the gas industry.

I do not wish to be understood as suggesting a method for each or any of my associates to follow, but merely to call attention to conditions that are favorable for the joint operation of these two branches of the lighting business, with an adequate return for the money invested in the electric lighting department. And if these conditions can be brought about, to recommend the joining of the two interests. Local conditions vary so widely and the local habits and prejudices of the consumer cut so decided a figure in the conduct of our business that one who is by necessity entirely unfamiliar with all these circumstances cannot lay down a few abstract facts and show you all how to make money by simply joining a gas and electric lighting plant.

The altogether abnormal development which has characterized electric lighting in the past, due to the persistent supply man (and I am sure no one who has had experience will question that his mendacious persistence is without parallel in the history of trade); due also to the ignorance of the investor (which cannot be disputed, for the light was but a few years old, and which is not disputed even by those whose pride would naturally prompt them to do so); and due still further to the well-known eagerness with which an American public, and particularly in the Western States, seizes upon anything novel. seems to have reached its limit. The supply man may be none the less persistent or mendacious, but the investor is much better informed and less gullible, while the consumer has tried the new light and satisfied himself that in general it is neither as satisfactory nor as cheap as the one it seeks to replace.

The business, then, is rapidly coming around to commercial lines, though retarded in many instances by the prejudice of disappointed rivalry. This is of great advantage to the gas industry, even more so in case of one management for both plants, although it may lessen the desirable features, as we shall later observe.

The most hopeful of the many papers on this subject, heretofore read before similar conventions, have never claimed a direct profit resulting from such ownership that was in any way commensurate with the outlay of capital necessary and the hazard of the enterprise. But there is one phase of the question I have never heard discussed, and, to me, it is the most important. It is the profit accruing to the gas company as a result of combined ownership. An indirect profit, if you please, on the money invested in electric lighting equipment. Let us suppose an ably managed gas company to have been first to cover its field with the new light. By judiciously timing such a start and investing only as fast as the state of the business would warrant (not at the suggestion of the interested supply man), an expensive competition would have been averted. I shall not attempt to give figures on the direct saving that would have resulted. It is a matter of many small items constantly expended, and may be large or small in amount according to the policy of the management of the companies. I have written several gas companies operating in competition with the electric light, asking an estimate on the direct annual cost of operating as a result of such competition. The answers vary as greatly as the pro rata output in different cities, and very much in the same proportion (when local conditions do not complicate the situation). In other words, wherever the policy of the gas company has been liberal and progressive and money and energy have been expended with good judgment, there you will usually find a better pro rata output than in another city, similarly situated, where the gas company has made no such determined effort. Is it not fair to assume that the two circumstances are connected? If each one of you who is managing a gas plant independently will carefully go over his accounts for running expenses, I am sure he will agree that many items could be cut off were it not for the constant menace that the other fellow would get the trade. How largely this enters into the policy of management and allows the delinquent list to creep up can only be determined by each individual manager. In addition to these possible means of saving, let me briefly run over the regular stock of arguments always used on this much discussed subject. There is economy of labor at plant, economy of steam, etc., salaries of bookkeeper and collectors, rent and all the incidental expenses necessary in keeping the office up to the standard. These are the direct and material savings, but the greatest advantage comes from the indirect profit arising from the combined ownership.

That manager of gas and electric lighting interests in a small city who has both gas and incandescent electric lights to sell at rates reasonable in proportion to cost of production and desirability at the same time, and who cannot convince the patrons of his company that gas more nearly meets his requirements, is certainly not in touch with the needs of his consumers, and, as such, is doing his company an injustice. Arc lighting has a sphere of its own. It is not entirely distinct from that of gas, but so much so that the competition is usually devoid of intense feeling. The incandescent light has many of the conveniences of the gas burner and enough that it does not possess to afford a plausible ground for competition canvassing. These have been placed before the public in all their attractiveness and with all the recklessness of capital unlimited and deceived. And wherever gas has been denied an able and energetic advertisement, the former has made serious inroads in the profit account of the gas company. Wherever the two are owned and managed together, the inclination of the public (which we have all experienced and most of us suffered) to give the new light a trial has been very much lessened; for the inclination is not alone to give the new light a trial, but also to give a competing company sustenance. Human nature is thus a potent factor in our business relations. The consumer who gets his information from a source as unprejudiced as the manager of two such companies ought to be, and who sees no opportunity to retard the growth and hamper the success of a possible bugbear of monopoly, is, in my opinion and experience, very likely to conclude for himself that gas more nearly meets his needs than does the electric light. The result is perfectly natural and very desirable; the company holds more of its old customers with gas and sells gas to more new ones.

Moreover, where the two lights meet in competition, the electric light allies itself with all the other enemies of the gas industry to hamper and cripple its usefulness and profit in the great and undeveloped field of fuel. The gas stove has no more active enemy to encounter upon its introduction than the wide-awake agent of the competing electric lighting company. Particularly is the entrance hard to effect in new houses where the electric light man desires to shut out all possible competition, and gas once introduced, even for fuel, offers a menace, a possibility of supplanting ultimately. So it is deemed good policy to keep gas out entirely. Those of us in the Eastern and older Middle States do not appreciate this to such an extent as our associates who manage gas plants in the more rapidly growing cities of the Western States, where many of the new and a large proportion of the best houses are not piped for gas at all.

All this is preliminary to the answer to the question, "How to make small electric light plants pay." A few moments ago we considered the direct savings. We have now looked hastily at some of the many combinations that may and do arise in the ceaseless and seemingly necessarily bitter competition with which the gas men are confronted. If, by a combination of ownerships, these may be avoided and the company be enabled to sell a greater amount of gag, it is very easy to realize a greater percentage on the total capital than on the lesser amount invested in the gas business exclusively in competition with the electric light.

You may say, gentlemen, that I am only suggesting a possibility; certain conditions under which such a plant might be made to pay. It is the only candid analysis I can give, for it is the only way I believe it can be made to earn money in the smaller cities. Simply as an alley and associate of the gas-selling business. So develop the demand for electric light that the expense of development will be reduced to a minimum, and that gas will receive its greatest benefits during the process in the amount sold.

Many able papers have been presented to the various associations of "gas men" during the past few years on this and kindred subjects. The cost of producing electrical energy has been thoroughly gone over and made known; economy in management has been carefully canvassed until you have access to all statistics that bear upon the conditions existing in your own cities.

My own contribution is entirely along the line of business policy. There still remains the bugbear of the future possibility in the development of electricity. Other things being equal, granted that we are earning, either directly or indirectly, a profit on our investment, do you not think it worth while to discount those possibilities? Do you not believe that the prior occupation of the field adds a permanence to the value of both plants? Each one of us must review his own situation and answer for himself. Whether these advantages are worth the cost or not depends upon the price paid for electrical machinery, either as first cost where the plant was new, or as the different conditions have appreciated or, more likely, depreciated the value of that used in the experiment of driving the gas company out of business; or whether on one of the flexible principles of reciprocity the gas company can install a plant on its own account and materially influence the depreciation of its competitors.

The public must be treated fairly; but the stockholders of the companies ought to share in that justice. Extensions of the electric department must be made on the same business lines as those which govern similar cases in the policy of the gas company. Prices must be consistent, and the annoying whims of consumers handled with the same judgment. If these conditions can be brought about I can guarantee any manager a reasonable profit through the combined ownership, together with a certain degree of contentment as nearly approaching comfort as the "light man" ever hopes to get.

If the "municipal ownership" craze takes possession of your city government, my advice, founded on experience, would be: Let the city light its own streets with its own electric lighting plant and you will hear little more of its going into a commercial enterprise as a source of profit. You will also have much less trouble from competing electric light companies, as will be apparent upon a moment's reflection.

Among the many examples I could cite to support my conviction on this subject the following will, perhaps, serve the purpose. There are two cities of nearly equal size within the territory of this Association so near together that local conditions are almost identical. Prices of gas and electric lighting are practically the same. In one the ownership is combined and the company sells 110 commercial arc lamps and has a total of less than 1,800 incandescent sockets, all on meters. It has over 2,200 gas meters and sells in round numbers 60,000,000 feet of gas per year. In the other, the invariable hostile feeling prevails that always attends the rivalry between a gas company that refuses to be driven into bankruptcy and an electric lighting company that persists in hovering on the verge. Here there are 130 commercial arcs in use and over 12,000 incandescent sockets, partly on contract and partly on meter. The gas company has less than 1,000 meters and sells not more than 25,000,000 feet annually. I need not give you the relative amounts invested or the percentage of profit realized. Those may be a little abnormal, but they serve as striking examples of the extreme possibilities in the two different lines of policy.

My answer to the question "How to make small electric light plants pay" would be: So handle your business that you sell enough more gas through the combined ownership and the profit will accrue in the actual money realized, and the permanence that will attach to the value of your plants.

The Central Electric Company, of Chicago, are now acting as general western agents for the W. S. Hill Electric Company of Boston, and are handling large quantities of their goods. The Hill switches are making their mark in the West as well as in the East.

AN OPTICAL PHASE INDICATOR AND SYNCHRONIZER.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, PHILADELPHIA, MAY 17, 1894, BY GEORGE S. MOLER AND FREDERICK BEDELL.

In starting a synchronous alternating current motor it is usual to bring the motor up to speed by some external means and to switch it into connection with the generator when the motor and generator are running synchronously, but are in opposite phase. Various devices have been employed to indicate synchronism and to show when the motor is in opposite phase to the generator, one of the simplest of these devices consisting of an incandescent lamp used as a pilot lamp. The lamp is connected directly in the circuit supplying the motor, so that all the current through the motor armature passes through it. Before the motor is started the lamp glows steadily. As the motor attains considerable speed, the lamp suddenly flashes up and dies out alternately, according to whether the electro-

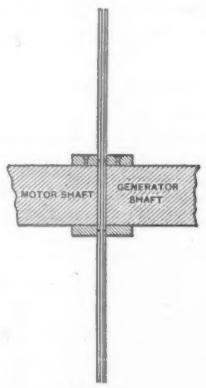


FIG. 1.

motive force generated by the motor and the electro-motive force from the alternator are in the same or in opposite phases. Beats are thus produced which occur at longer intervals as the motor approaches synchronism with the alternator. When the intervals are long enough to be quite marked, the motor is connected directly to the generator circuit by cutting the lamp out at a moment when it is dark, indicating that the machines are in opposite phase. At the same time the external power, which has driven the motor to synchronism, is removed. Instead of one lamp, several lamps or a lamp together with dead resistance may be used where required.

The device is simple and efficient. It does not, however, indicate the moment when exact synchronism is reached, nor does it show whether the motor is running at a greater or less speed than that corresponding to the generator. It does not show the exact phase difference between the motor and generator, and does not indicate the phase relations after the motor has been connected to the alternator, and is being driven by it.

The following instrument has been devised by the writers to give definite information in regard to the relative speeds and phase positions of the motor and generator in laboratory investigation. It shows:

1. When the machines are synchronous.
2. Which machine is running the faster when they are not synchronous.
3. The angle by which the motor lags behind the generator.

We will first describe the simplest form of the phase indicator. The motor and generator are placed together, with shafts in line and abutting, but not quite touching. The two machines must have the same number of poles, so that a revolution of the armature of each represents the same number of alternations. The abutting ends of the shafts carry two disks, one connected rigidly with the motor armature, the other similarly connected with the armature of the generator, as shown in Fig. 1. In these disks are curved

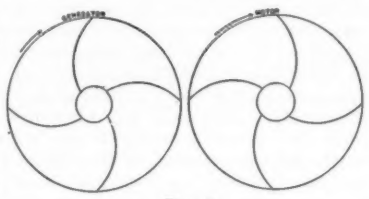


FIG. 2.

slits, one slit for each pair of poles of the machines. These slits are shown in Fig. 2 for an eight pole machine. The two disks are in every way similar, the one being the reverse of the other. The two disks are practically superimposed, and together form one disk with four holes, where the slits of one disk cross over the slits of the other. Evidently, the distances of these four holes from the center depend upon the relative positions of the two armatures; they move in and out as the armatures shift their relative positions. From the symmetrical arrangement of the slits, if one armature is stationary and the other is moved past two pole pieces, or through 90 degrees of arc (corresponding to a complete period of alternation, or 360 degrees of phase), the intersection of the slits will be the same distance from the center as before. The curvature of the slits is such that the distance to or from the center that the intersections of the two sets of slits move is proportional to the change in relative position of the two armatures.

When the two armatures are running at the same speed in the same direction and there is a source of light on one side of the disks, the intersection of the slits, as seen from the other side, appears as a continuous ring of light. A slight difference of speed causes this ring of light to move outward or inward, according to which disk is revolving the faster. The more rapidly the ring moves in or out, the greater the difference in speed of the two disks. If the ring is moving out, a new ring starts at

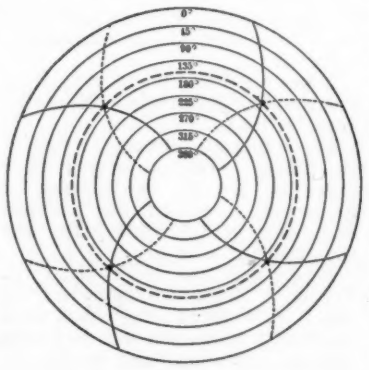


FIG. 3.

the center when one ring reaches the edges, and these rings keep following one another outward. If the difference in speed is the other way, the successive rings move inward.

In Fig. 3 the heavy dotted line represents the ring of light for a particular position of the two disks.

The position of the ring of light indicates the relative position of the two armatures. The disks may be secured to the shafts, so that when the armatures are in the same positions with reference to the pole pieces (*i. e.*, the machines are in the same phase), the ring of light will be at the inner or outer ends of the slits. The concentric rings in Fig. 3 represent the phase differences corresponding to positions of the ring of light in this case.

For convenience in operation, the arrangement of the apparatus, which has thus far proved satisfactory, has been as follows: On one side of the pair of disks is placed an incandescent lamp enclosed in a box. One side of the box is close to the disks and has a slit in it about half an inch wide, extending from the shaft to the circumference of the disk. This slit is covered with a piece of oiled paper, so as to give a diffused light upon the disks. A complete ring of light is no longer seen from the other side, but only a small portion, corresponding to the width of the half-inch slit. A stationary scale is fixed so as to extend from the shaft to the edge of the disks on the opposite side from the lamps, so that the distance of the changing line of light from the center may be read so as to give the phase difference of the two machines by direct reading. To enable one to see the scale and line of light most conveniently, a mirror is arranged at 45 degrees with the disks, so that the line of sight is at right angles to the shaft.

The disks may be arranged in the manner just described upon the abutting ends of the motor and generator shafts only in case the two machines have the same number of poles. Where such is not the case, one or both of the disks can be driven by gears, which will give the proper relative speeds of the two disks.

In operation the instrument has proved quite satisfactory, giving exact and definite information concerning the changes in the armature lag of the motor. The fluctuations in this lag are usually quite marked, and the conditions which cause them can be readily investigated by this apparatus. For instance, this fluctuation is small, with proper field excitation; as the field current of the motor is diminished this fluctuation increases, the line of light moving rapidly back and forth through a greater and greater distance, which finally becomes so great as the excitation is weakened, that it goes a distance beyond which it cannot recover, *i. e.*, the motor gets out of step and stops. It would be possible to make a more detailed investigation of these fluctuations by means of a revolving mirror, and they may be photographed and made of permanent record by means of a moving plate.

The apparatus can be applied to other lines of work involving an investigation of phase differences and synchronism, and may be modified to meet the requirements of the problem in hand; but it is peculiarly suited for use in synchronous motor work, for which it was designed. The scope of the present paper admits only of a general description of the apparatus here given.

Comment on American Electrical Talent.

The Americans have a lot to boast about, and so have we; but if the Metropolitan Traction Company, of New York, introduce, as is stated, the conduit system as employed at Buda-Pesth, this will show that even in electric traction our American friends do not "lick creation" when they have to come to Europe for an open conduit system.—*London Electrical Engineer.*

OUR NEW ENGLAND LETTER.

The American Circular Loom Company have just closed a contract for 125,000 feet of their flexible interior conduit for one New York building.

The Beacon Vacuum Pump and Electrical Company have just begun to put out a 32 candle-power lamp of the "New Beacon" type, and a 16 candle-power anchored filament railway lamp of their original design. The price of these last two productions are in line with the regular 16 candle-power Beacon lamps, the 32 candle-power selling in barrel lots for 35 cents and the railway lamps in same quantities for 27½ cents. This latter price is exactly 50 per cent less than the prevailing prices of a year ago. The Beacon company has been in correspondence with all users of their lamps during the past season with a view of ascertaining their feelings in regard to them, and inviting criticism. The answers received are of a very satisfactory nature. They are on file in the office of General Manager H. S. Kaliske, and are open to inspection.

The Underwood Manufacturing Company, of 126 Pearl street, Boston, who have for a long time acted as New England agents for the Dodge Manufacturing Company, of Mishawaka, Ind., have sold their entire stock of Dodge Independence wood split pulleys to the latter company, who will hereafter carry on the business in their own name. The Dodge Manufacturing Company is one of the largest and best known concerns among power users in the country, and their power transmitting appliances have acquired more than a national reputation. Mr. F. H. Underwood, the genial and popular president of the Underwood Manufacturing Company, has severed his official connection with the parent company and has accepted the post of resident manager for the new concern. The Dodge Manufacturing Company are to be congratulated on being represented by a man so well known and universely esteemed in this section as is Mr. Underwood, and one who has already done so much towards furthering their interests. He will conduct the business in future on a larger scale than has heretofore been possible, and on or about July 1 will take possession of the large buildings, Nos. 137-139 Purchase street, which will afford a floor space of something over 20,000 square feet. In addition to a full line of the celebrated wood split pulleys, they will carry a complete stock of patent self-oiling hangers, turned steel shafting and other power transmission appliances. Arrangements have also been made under the new management to handle the Underwood Manufacturing Company's cotton leather belting and other specialties, and large stocks will be kept on hand for immediate delivery. The Dodge Manufacturing Company are now getting up a very handsome 200 page catalogue, which will be ready for distribution about July 1. It is intended to make the new location headquarters in the East for all power transmitting appliances, and aside from an unrivaled stock from which to make selections, buyers will receive the advantages of untiring courtesy and attention on the part of Mr. Underwood and his able assistants.

Boston, June 15. H. G. T.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.

THIRTEENTH ANNUAL MEETING BEGAN JUNE 13 AT DETROIT—THE PROCEEDINGS, ADDRESSES AND ATTENDANCE.

The thirteenth annual meeting of the Association of Railway Telegraph Superintendents was held at Hotel Cadillac, Detroit, June 13 and 14. The meeting was called to order on Tuesday, at 11 A. M., by President U. J. Fry, of Milwaukee. The following members and guests were present:

C. G. Sholes, A., T. & S. F., Topeka, Kas.; G. M. Dugan, I. C. R. R., Chicago; F. S. Spafard, B., C. R. & N., Cedar Rapids, Ia.; A. R. Lingafelt, C., R. I. & P., Topeka, Kas.; C. F. Annett, I. C. R. R., Chicago; N. McKinnon, T., St. L. & K. C., Toledo, O.; J. W. Lattig, L. V. R. R., South Bethlehem, Pa.; J. S. Evans, N. Y. C. & St. L., Cleveland, O.; H. B. Ware, B. & M., Wymore, Neb.; P. W. Drew, W. C. R. R., Chicago; N. B. Patterson, Detroit; R. W. Pope, New York; T. R. Taltavall, New York; W. S. Logue, New York; U. J. Fry, C. M. & St. P., Milwaukee; Geo. T. Williams, Cleveland; G. C. Kinsman, Wabash Ry., Decatur, Ill.; Geo. L. Lang, N. Y. & N. E., Boston, Mass.; A. R. Swift, C., R. I. & P., Chicago; C. W. Hammond, Missouri Pac., St. Louis; C. Selden, B. & O., Baltimore; O. C. Greene, Northern Pac., St. Paul; E. E. Torrey, Mich. Central, Detroit; W. W. Ryder, C., B. & Q., Chicago; M. B. Leonard, C. & O., Richmond, Va., J. W. Fortune, Grand Trunk Ry., Detroit; H. C. Hope, C., St. P., M. & O., St. Paul; H. C. Sprague, K. C., Ft. S. & M., Kansas City, Mo.; M. Magiff, Vermont Central, St. Albans, Vt.; S. K. Bullard, M., K. & T., Sedalia, Mo.; E. R. Adams, P. & R., Reading, Pa.; E. A. Chenery, T. R. R. Association, St. Louis, Mo.

Mr. Geo. W. Balch, an "old timer," and for 40 years a resident of Detroit, made an address of welcome. He referred to the fact that the system of train dispatch which originated on the Erie Railway was next introduced upon the Michigan Central Railroad, where it was improved and perfected, and remains practically unchanged at the present day. The original motto which was posted in the dispatcher's office, "Eternal vigilance is the price of safety," was still the safeguard of the railroad service. Upon request of the president, the secretary of the association, Mr. P. W. Drew, responded in its behalf. The Committee of Arrangements reported that courtesies had been extended to the association by the Grand Trunk and the Michigan Central Railways, the Detroit Street Railway, the Detroit and Cleveland Steamboat Company, and others. The American Telephone and Telegraph and the Western Union Telegraph Companies also placed their facilities at the disposal of the association, special instruments having been placed in the hotel for the convenience of members. The following new members were elected: W. F. Packard, B., R. & P. R. R., Rochester, N. Y.; J. A. Frates, chief dispatcher, I. C. R. R., Jackson, Tenn.; H. N. Daniell, division operator, L. V. R. R., Sayre, Pa. The report of the secretary and treasurer was read and accepted. Reports of Committees on Badges, Topics and Service Cards were also read and accepted. A recess was then taken until 8 P. M., the afternoon being very pleasantly occupied by an excursion to Des-Chree-Shose-Ka, or Fighting Island.

At the Tuesday evening session, the Committee on Service Rules presented a report, including a code of 52 rules, defining the duties of superintendents, division operators, chief linemen and operators. The evening was entirely devoted to its discussion in detail.

The following officers were elected for the ensuing year: O. C. Greene, St. Paul, president; E. R. Adams, Reading, Pa., vice-president; P. W. Drew, Chicago, secretary and treasurer (re-elected).

Mr. J. W. Lattig, of the Lehigh Valley Railroad, read a paper on "Machine Currents and Railroad Telegraph Lines."

In discussing this paper, Mr. Adams said that it might be thought that the use of machines would necessitate considerable care and attention. This was not the case. He had had three dynamos running since November 1, one of which had been run continuously. He has a reserve machine, but has been running one to see how long it would give good service. It needed oiling but once in two weeks. His experience proved that wires in the Reading service, which in bad weather would need to be divided into two circuits, could be worked through without difficulty under the same conditions using a machine current. The current on the line was even, and the way offices remained in adjustment at all times.

Mr. Ryder, of Chicago, stated that he had been using storage batteries for the operation of sounders, and after two and one-half years experience he considered that there was no question of their superiority over the gravity battery. Mr. Lattig said that it was his intention to rewind his sounders and insert resistance in the circuits, and he believed he would succeed in using the same dynamos for main and local circuits.

Mr. Frank B. Rae, of Detroit, said that he was electrician for the Western Union Telegraph Company with Stephen D. Field when the original experiments were made which demonstrated the feasibility of the plan, and gave some very interesting details of later experiments made by himself at Chicago.

Mr. A. R. Swift, of Chicago, read a paper in which he called attention to the perfunctory service of employés under existing conditions. He regretted that the enthusiasm which prevailed in the telegraphic service years ago had passed away, and that the tendency of the times was in the direction of securing extra pay for extra work.

A paper on "The Protection of Highway Crossings with Electric Bells," by R. J. W. Danley, of Columbus, O., was read by Mr. G. C. Kinsman.

Mr. A. R. Lingafeldt, of Topeka, Kas., "On the Inefficiency of the Ordinary Telegraph Operator to Properly Test and Locate Wire Troubles" seemed to awaken a sympathetic chord in the breast of every member present. He gave as an illustration an anecdote of an operator who pulled out and carried away all the switch plugs, for the reason that he did not want the other fellow to be monkeying around the switchboard.

Mr. Lattig admitted that the speaker had called attention to the weakest point of the railway telegraph service, which he had already undertaken to remedy. He had appointed an inspector, provided with a properly ruled book, who visited the various offices in turn and reported all defects, and at the same time imparted to the operators such instructions as he found necessary.

Mr. Charles Selden, of Baltimore, read a paper on "The Railroad and The Telephone." Mr. Bates of the American Telephone and Telegraph Company said that the Pennsylvania Railway was using the long distance telephone extensively. They have a system connecting the main executive office in Philadelphia with Pittsburgh, Altoona and Harrisburg, or wherever division superintendents are located. They also have telephones at the residences of these officers, so that consultations may be held at any time. Mr. Selden said that his company had been running trains on Staten Island governed by telephones successfully for two years, until a superior officer had heard of the practice and ordered it discontinued. After the full telegraph dispatching force had been on duty a week, serious trouble had arisen. Mr. Lattig said that the Lehigh Valley Railroad had used the telephone quite extensively during the strike. Every division now has a long distance telephone, owing to the fact that the lines of the telephone company extended through the Lehigh Valley so that communication could be had independent of the railroad company's wires. He had also understood that the New York Central Railroad had equipped an independent line between New York and Albany with telephones at each way office.

At 1 o'clock the meeting took a recess and devoted the afternoon to an excursion up Woodward and Jefferson avenues upon special electric cars provided by the Detroit City Railway Company. Returning to the city the party boarded the steamer "Sappho" for Belle Isle, where carriages conveyed them around the drive of this pretty celebrated park. About 20 ladies were in the party, among them, Mrs. Swift, Mrs. Selden, and daughter, Mrs. Drew, Mrs. Ryder, Mrs. Magiff, Mrs. Fortune and daughter, Mrs. Kinsman, Mrs. Dugan and others.

At the evening session legislation on the rules was completed. A paper was read by Mr. Ralph W. Pope on "Automatic Train Blocking and Stopping," in which he called attention to the fact that the weak point in block systems had evidently been eliminated by the invention by Mr. F. E. Kinsman of an automatic electro-pneumatic device by which steam in the locomotive was shut off and the air brakes applied without the knowledge or action of the locomotive engineer.

It was voted that the next meeting of the association be held at Montreal, June 14, 1895.

The "Electric Lighting of Passenger Trains" was the subject of a paper by Mr. M. B. Leonard, of Richmond, based on the practical experience of the Chesapeake and Ohio Railroad Company.

Papers were also read by Mr. U. J. Fry on "Magneto Telephones;" by Mr. L. S. Wells, of Long Island City, on the "Protection of Buildings Against Lightning," and by Mr. G. L. Lang, of Boston, on "Failures in Fuse Wires." Thanks were tendered to the various individuals and companies for courtesies extended, and especially to Messrs. Fortune and Torrey of the Committee of Arrangements for their untiring exertions in providing for the entertainment of the association. Friday the members and guests were entertained by the Grand Trunk Railway, which gave them an excursion to Port Huron, accompanied by a dinner at the company's hotel. The return trip was made by boat down the St. Clair river.

TELEPHONE NEWS AND COMMENT.

The Metropolitan Telephone Company, New York, was never better managed — executively and technically.

The New England Telephone Company is expected to pay $1 per share dividends quarterly hereafter—an increase.

Mayor Schieren of Brooklyn, N. Y., has again vetoed the telephone franchise of the Eastern Company. It is having a hard time.

There is no reason why a carefully constructed magneto-telephone exchange should not give the best of satisfaction in smaller towns.

Over 30 per cent of the lines of the Cincinnati company have been changed to metallic circuits, and orders are in for two months' work additional.

The Boston *Herald* figures that with the dividend recently declared the Bell Telephone Company will have distributed $24,307,752 in dividends.

There are a number of strong names soon to be identified with opposition to the Bell interests, provided present negotiations go through all right. These names will assure the best financial strength.

A very attractive and convenient directory of the Cincinnati Bell Telephone Company has been received at this office. It is indexed throughout. The Long Distance company is now in communication with Cincinnati.

A conference of the presidents of the telephone companies in the East was held in Boston last week. The question of reducing the long-distance rates for second five minutes is under discussion, and it is expected that a reduced schedule will be adopted. Other matters of importance to the licensees were discussed.

At the stockholders' meeting of Erie Telegraph and Telephone Company and the Southwestern Telegraph and Telephone Company in New York last week directors and officers were re-elected. President Levi Sprague presided at both meetings. The company is very prosperous. Mr. Charles J. Glidden, of Lowell, is the treasurer.

The Bell company has declared its regular quarterly dividend of three per cent. For the first time since 1888 no extra dividend was declared at this time. Last February, upon the expiration of the original Bell Telephone patent, the company made a concession in telephone rentals to its licensees or sub-companies, which was figured to amount to a net loss of $600,000 in the income of the American Bell Telephone Company. This, upon the latter's share capital of $20,000,000, was a loss of $3 per share, and is sufficient to account for the dropping of the extra dividend this July.

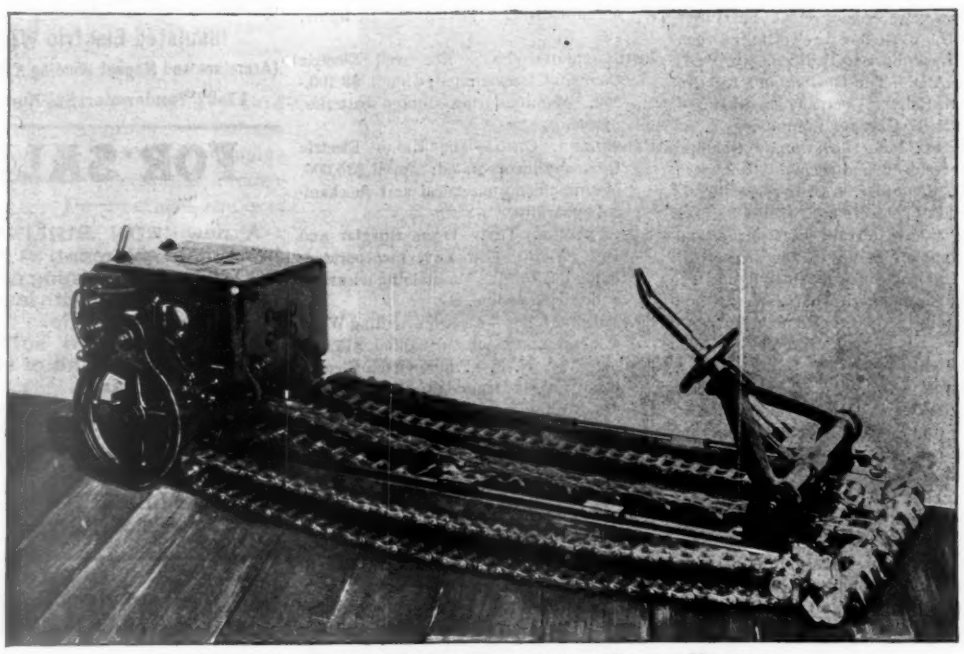
General Electric Company's Electric Coal Cutter.

The illustration herewith shows a new and improved device for cutting coal which has just been designed and perfected by the General Electric Company. It is known as R. B. 40 and is of the rotating bar type. It consists principally of a bed frame of two steel channel bars firmly braced. Mounted upon and engaging with this bed frame is a sliding frame similarly braced, consisting of two steel bars, at the rear end of which is mounted an ironclad multipolar electric motor communicating power to the feed and driving mechanism. The front end of this sliding frame carries the cutting bar, into which the cutters or bits of tool steel are held by set screws. When the cutter bar is revolved these cutters or bits cover its entire face. The bar is driven by an endless chain, and as it is revolved is advanced by the feed mechanism into the coal or other material to be cut to the desired depth, and the cuttings are brought out to the face of the coal by means of cleaner chains. This machine is operated by two men; one in charge of the machine and the other as a helper. A carriage is furnished with the machine, which enables it to be handled with ease. The machine is taken into the mine on this carriage and run into the room to be undercut. It is then placed on two skid boards in front of the coal at one side of the room or entry to be under-cut, and is fastened firmly by means of the front and rear jacks which are braced against the face and roof of the coal. These prevent the machine from moving when in operation. The power is then turned by the machine runner, and the machine proceeds to its work.

The cutter bar which is revolved by an endless chain, is fed forward to a depth of five or six feet, according to the size of the machine. The usual length of the cutter bar is thirty-nine inches, but forty-two or forty-eight inch bars can be used where the cutting is not too hard. When the full depth is reached, the feed is thrown off, and by means of a reverse lever the cutter bar is withdrawn to its starting point and automatically stopped. This completes the cut, and the machine is moved over the length of the cutter bar used and another cut made in the same manner. This is continued until the entire width of the room or entry is under-cut, after which the machine is again loaded on the carriage and taken into another room.

The cuts are made in the short space of time of from four to six minutes. The amount of coal undercut or the lineal feet face for each machine depends upon the quality of the coal and the skill of the man handling it.

The construction of this machine is extremely simple, and any person of ordinary intelligence can understand and handle it with a few days instructions. All parts are made in duplicate and are interchangeable.



General Electric Company's Electric Coal Cutting Machine.

ELECTRIC LIGHT FLASHES.

The Chicago Edison Company shows a surplus of $254,260 for 15 months ending March 31.

The Edison Electric Illuminating Company, of New York, makes the following showing:

	1894.	1893.	Inc.
May, gross	$98,344	$93,185	$5,159
Net	46,864	37,387	9,477
Surplus after charges.	28,898	26,417	2,481
Five mos., gross	586,403	524,343	62,159
Net	323,140	248,104	75,035
Surplus after charges.	241,641	183,300	58,341

The Steelton, Pa., Light, Heat and Power Company are in the market for one 300 horse-power engine, considerable shafting and a 2,500 light alternating dynamo. Mr. Jerome Hite is the purchasing committee for the company.

A mortgage was filed at Winona, Minn., on June 1, in which the Winona General Electric Company mortgages to the Northwest General Electric Company of St. Paul all the property and franchises of the former company. The amount of money involved is $150,000. The mortgage was given as security for 30 notes of $5,000 each, due June 1, 1895.

The Illinois Valley Electric Light and Power Company, of Ottawa, Ill., has been forced to the wall by two judgments aggregating $11,000, one for $9,800 on six notes held by the National City Bank, and the other for $1,200, held by Colonel Fullerton. The company operated an extensive plant for Ottawa and Marseilles, and has been in business about five years.

The Elmwood, Ill., Electric Light Company has a franchise and contract with the town of Yates City, Ill., and will at once extend lines to that place, about three miles. Bottom prices are wanted on weatherproof wire on reels, 15 double carbon 10 ampere arc lamps, incandescent lamps, sockets, cord, insulators, cross-arms, etc., for six miles of circuit. Also 300 poles, 25, 30 and 35 feet.

The Brooklyn, N. Y., Board of Aldermen has granted franchises to the State Electric Light and Power Company, of which Noah L. Cocheu is president, and to the Kings County Electric Light Company, of which Mirabeau L. Towns is president. Mr. Cocheu had been fighting for this franchise for the past four years. Each company is to pay the city $500 a year in addition to one per cent of the gross receipts. The vote granting the franchise stood 13 to 3.

At a recent meeting of the stockholders of the United Electric Light and Power Company of New York city they authorized the president and secretary of the company to execute and deliver to the Union Trust Company an instrument mortgaging to the Trust Company all the property, real and personal, and all the franchises, privileges and immunities of the company for $5,000,000. The money is to be used by the electric company to liquidate its floating indebtness and to retire outstanding bonds, and also for the extension and development of the concern. Five thousand coupon bonds were issued at five per cent, aggregating $5,000,000.

ELECTRIC RAILWAY NOTES.

It is expected that the electric road at Lockport, N. Y., will be in operation by September 1.

A charter has been granted the Honesdale, Pa., Electric Railway Company with a capital of $50,000.

A proposition is said to be on foot to organize a company to purchase the Schuylkill canal and build a trolley road along the towpath.

The Brooklyn, N. Y., City Railroad scored its biggest day's traffic on Sunday, June 10, since the organization of the company, the passengers on all the trolley lines aggregating 460,000.

Brooklyn Bridge trustees are said to have been in conference last week with the General Electric Company, with reference to the substitution of electric power for the cable in operating the bridge cars.

The bondholders of the Milwaukee Street Railway Company are reported to have waived their right to 18 months' interest, amounting to $250,000, to save the road from going into the hands of a receiver.

Chancellor McGill, of New Jersey, holds that an electric system is but a modified horse railway system, and that companies have a right to erect poles without abutting property owners being entitled to any extra compensation.

The Bridgeport, Conn., Traction Company has begun the excavation for its new power station. Poles are being located and deliveries of the trolley line insulators, furnished by the H. W. Johns Manufacturing Company, will soon begin.

W. G. Decelle, of St. Paul, president of the Fond du Lac Light, Power and Railway Company, announces that his company will abandon its street railway system in Fond du Lac, Wis., because of lack of patronage and the antagonisms of the public and City Councils to its plans.

A good start has been made toward laying the foundation for the power station of the Nassau Electric Railway Company, Brooklyn, N. Y., and the track and overhead construction are progressing rapidly. The company has already received several large shipments of trolley line insulators from the H. W. Johns Manufacturing Company, of New York.

The Leavenworth, Kas., Electric Railway, the last division of which was put into operation on June 1, was sold at receiver's sale on June 2, by W. C. Hook, master in chancery, to M. Summerfield, of Lawrence, Kas., Herbert N. Smith, of Boston, and J. P. Edmington, of Denver, for $80,000. Newman Erb, of New York, was receiver. The cost of converting the old horse car lines into the present road, exclusive of the rapid transit road, which cost $180,000, was $130,000. The new company has filed application for charter and organized by electing Newman Erb, president; Herbert N. Smith, vice-president; J. P. Edmington, secretary and treasurer; and Louis M. Erb, manager.